

REMARKS

Since this response to the Advisory Action dated August 11, 2009 includes an RCE filed before the expiration of the statutory period for reply to the final Office action, Applicants respectfully submit that abandonment of the present application is **avoided**.

Present Status of the Application

The Office action rejected claims 1-17 under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over JP06-212451.

The Office action rejected claims 1-17 under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over JP06-198466.

The Office action rejected claims 5 and 9-12 under 35 U.S.C. 103(a) as being unpatentable over either of JP06-212451 and JP06-198466, and further in view of JP02-085350 or in view of US 2002/0001779 to Hidaka et al..

The Office action rejected claims 6 and 13 under 35 U.S.C. 103(a) as being unpatentable over either of JP06-212451 and JP06-198466 as applied to claim 1 above, and further in view of US 6,031,201 to Amako et al..

The Office action rejected claims 5 and 9-12 under 35 U.S.C. 103(a) as being unpatentable over either of JP06-212451 and JP06-198466 as applied to claim 7 above, and further in view of US 2002/0001779 to Hidaka et al or in view of US 5,812,629 to Clauser.

After carefully considering the Office action and the cited references, Applicant have amended claims 1, 4-7, and 11-17 and respectfully traverse all the rejections on the grounds set

forth in detail below. Upon entry of the foregoing amendments, Applicants respectfully submit that all the pending claims 1-7 and 9-17 are placed in proper condition for allowance, and reconsideration of all the pending claims is respectfully requested.

Response to Claim Rejections under 35 U.S.C. 102

Claims 1-17 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over JP06-212451.

Claims 1-17 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over JP06-198466

In response thereto, Applicants have amended claims 1 and 7 and respectfully traverse all the rejections on the grounds set forth in detail below.

Independent claims 1 and 7, as amended, each contain the technical feature reciting “irradiating a (uniaxial) laser beam near an ablation threshold to a surface of a material **without** heat-treating the surface of the material with a reactive gas to form a film as a wave-guide path”.

In contrast, JP06-212451 discloses forming an interference fringe on a metal surface by radiating a laser beam. Referring to paragraphs 0015-0017 of JP06-212451, the metal surface that has been heat-treated reacts with the reactive gas to form a film as a wave-guide path. When a laser pulse radiates on the wave-guide path, an interference fringe is formed on the metal surface to ablate micro-unevenness on the metal surface.

Similarly, referring to paragraph 0007 of JP06-198466, the metal surface that has been heat-treated reacts with the reactive gas to form a film as a wave-guide path. When the laser beam L and

laser beam La is transferred through the wave-guide path, the interference fringe is formed on the metal surface to ablate micro-unevenness on the metal surface.

Both JP06-212451 and JP06-198466 disclose forming an interference fringe on a metal surface by forming a film on the metal surface by using a reactive gas to react with the metal surface. However, in the present application, a periodic structure is formed by using the method comprising “irradiating a uniaxial laser beam near an ablation threshold to a surface of a material without heat-treating the surface of the material with a reactive gas to form a film as a wave-guide path” instead of using a wave-guide path formed by a reactive gas.

In both JP06-212415 and JP06-198466, a laser beam is repeatedly irradiated on a metal surface to form a wave-guide path. The light traveling in the wave-guide path and the incident light interfere with each other to form a micro pattern perpendicular to the direction in which the light travels in the wave-guide path.

However, no wave-guide path formed by a reactive gas is required in the present application. The present application discloses irradiating laser energy on the material surface with energy near an ablation threshold without heat-treating the surface of the material with a reactive gas to form a film as a wave-guide path. In the present application, by using process-interdependency in polarization direction, a periodic structure perpendicular to the polarization direction of the laser beam is formed.

In comparison with the methods requiring formation of the wave-guide path in the two cited references JP06-212451 and JP06-198466, energy unevenness caused by interference rarely occurs in the present application. In the present application, the periodic structure is formed without the

formation of a wave-guide path, which is formed by irradiating a laser beam as a non-pre-interfering light beam. Also, in the present application, the direction of the periodic structure is changed by merely changing the polarization direction.

Furthermore, in both JP06-212451 and JP06-198466, a laser beam is irradiated in a reactive gas atmosphere, therefore the reactive gas should be selected according to the material forming the periodic structure. Hence the choices for the material are limited.

Since the pulse width of the ultra-short pulse laser (femtosecond laser) is narrow, thermal diffusion is slight. Once the femtosecond laser irradiates the material surface, the temperature present near the irradiated region rarely rises. Therefore, a femtosecond laser cannot be used in JP06-212451 and JP06-198466, which require the heated metal surface to react with the reactive gas. That is, the specific effect of the present invention, i.e. “when a femtosecond laser is used, the thermal diffusion is reduced to a practically negligible level, which is advantageous for processing small parts” cannot be achieved in JP06-212451 and JP06-198466.

In summary, Applicants respectfully submit that both JP06-212451 and JP06-198466 fail to disclose the technical feature reciting “irradiating a (uniaxial) laser beam near an ablation threshold to a surface of a material without heat-treating the surface of the material with a reactive gas to form a film as a wave-guide path” of claims 1 and 7, so that claims 1 and 7 are neither anticipated by nor unpatentable over JP06-212451 or JP06-198466 and are allowable.

Since claims 1 and 7 are allowable, claims 2-6 and 9-17 dependent thereon should also be allowed, as a matter of law, for they contain all the limitations of their respective independent claim. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Response to Claim Rejections under 35 U.S.C. 103

Claims 5 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over either of JP06-212451 and JP06-198466, and further in view of JP02-085350 or in view of US 2002/0001779 to Hidaka et al..

Claims 6 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over either of JP06-212451 and JP06-198466 as applied to claim 1 above, and further in view of US 6,031,201 to Amako et al..

Claims 5 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over either of JP06-212451 and JP06-198466 as applied to claim 7 above, and further in view of US 2002/0001779 to Hidaka et al or in view of US 5,812,629 to Clauser.

In response thereto, Applicants have amended claims 1 and 7 and respectfully traverse all the rejections on the grounds set forth in detail below.

As stated above, Applicants respectfully submit that neither JP06-212451 nor JP06-198466 discloses the technical feature reciting “irradiating a (uniaxial) laser beam near an ablation threshold to a surface of a material without heat-treating the surface of the material with a reactive gas to form a film as a wave-guide path” of claims 1 and 7, as amended.

In addition, Applicants also respectfully submit that none of JP02-085350, US 2002/0001779 to Hidaka et al., US 6,031,201 to Amako et al., and US 5,812,629 to Clauser discloses said technical feature. Therefore, claims 1 and 7 are patentable over JP06-212451, JP06-198466, JP02-085350, US 2002/0001779 to Hidaka et al., US 6,031,201 to Amako et al., and US 5,812,629 to Clauser, taken alone or in any combination and are allowable.

Since claims 1 and 7 are allowable, claims 5, 6, and 9-13 dependent thereon should also be allowed, as a matter of law, for they contains all the limitations of their respective independent claim. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

CONCLUSION

For at least the foregoing reasons, it is believed that all the pending claims 1-7 and 9-17 of the present application are patentable. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

Respectfully submitted,
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